REMARKS

In the Office Action, the Examiner rejected claims 1-35. By this paper, the Applicant hereby amends claims 1, 12, 23, 34 and 35, and adds six new dependent claims 36-41 for clarification of certain features to expedite allowance of the present application. These amendments and the new claims do not add any new matter. Upon entry of these amendments, claims 1-41 remain pending in the present application and are believed to be in condition for allowance. In view of the foregoing amendments and the following remarks, the Applicant respectfully requests reconsideration and allowance of all pending claims.

Rejections under 35 U.S.C. § 102

In the Office Action, the Examiner rejected claims 1-6, 8-17, 19-28 and 30-33 under 35 U.S.C. § 102(b) as anticipated by Bernier et al. (U.S. Patent No. 4,215,412, hereinafter "Bernier"). Applicant respectfully traverses these rejections.

Legal Precedent and Guidelines

First, the pending claims must be given an interpretation that is reasonable and consistent with the *specification*. *See In re Prater*, 415 F.2d 1393, 1404-05, 162 U.S.P.Q. 541, 550-51 (C.C.P.A. 1969) (emphasis added); *see also In re Morris,* 127 F.3d 1048, 1054-55, 44 U.S.P.Q.2d 1023, 1027-28 (Fed. Cir. 1997); *see also* M.P.E.P. §§ 608.01(o) and 2111. Indeed, the specification is "the primary basis for construing the claims." *See Phillips v. AWH Corp.*, No. 03-1269, -1286, at 13-16 (Fed. Cir. July 12, 2005) (*en banc*). One should rely *heavily* on the written description for guidance as to the meaning of the claims. *See id.*

Second, interpretation of the claims must also be consistent with the interpretation that *one of ordinary skill in the art* would reach. *See In re Cortright*, 165 F.3d 1353, 1359, 49 U.S.P.Q.2d 1464, 1468 (Fed. Cir. 1999); M.P.E.P. § 2111. "The inquiry into how a person of ordinary skill in the art understands a claim term provides an objective baseline from which to begin claim interpretation." *See Collegenet, Inc. v. ApplyYourself, Inc.*, 418 F.3d 1225, 75

U.S.P.Q.2d 1733, 1738 (Fed. Cir. 2005) (quoting *Phillips v. AWH Corp.*, 75 U.S.P.Q.2d 1321, 1326). The Federal Circuit has made clear that derivation of a claim term must be based on "usage in the ordinary and accustomed meaning of the words amongst artisans of ordinary skill in the relevant art." *See id.*

Third, anticipation under section 102 can be found only if a single reference shows exactly what is claimed. *Titanium Metals Corp. v. Banner*, 778 F.2d 775, 227 U.S.P.Q. 773 (Fed. Cir. 1985). For a prior art reference to anticipate under section 102, every element of the claimed invention must be identically shown in a single reference. *In re Bond*, 910 F.2d 831, 15 U.S.P.Q.2d 1566 (Fed. Cir. 1990). To maintain a proper rejection under section 102, a single reference must teach each and every limitation of the rejected claim. *Atlas Powder v. E.I. du Pont*, 750 F.2d 1569 (Fed. Cir. 1984). Accordingly, the Applicants need only point to a single element not found in the cited reference to demonstrate that the cited reference fails to anticipate the claimed subject matter. The prior art reference also must show the *identical* invention "*in as complete detail as contained in the ... claim*" to support a *prima facie* case of anticipation. *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 U.S.P.Q. 2d 1913, 1920 (Fed. Cir. 1989).

Fourth, if the Examiner relies on a theory of inherency, the extrinsic evidence must make clear that the missing descriptive matter is *necessarily* present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill. *In re Robertson,* 169 F.3d 743, 49 U.S.P.Q.2d 1949 (Fed. Cir. 1999) (Emphasis Added). The mere fact that a certain thing *may* result from a given set of circumstances is not sufficient. *Id.* In relying upon the theory of inherency, the Examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic *necessarily* flows from the teachings of the applied prior art. *Ex parte Levy,* 17 U.S.P.Q.2d 1461, 1464 (Bd. Pat. App. & Inter. 1990) (emphasis in original). The Examiner, in presenting the inherency argument, bears the evidentiary burden and must adequately satisfy this burden. *See id.*

Regarding functional limitations, the Examiner must evaluate and consider the functional limitation, just like any other limitation of the claim, for what it fairly conveys to a person of ordinary skill in the pertinent art in the context in which it is used. *See* M.P.E.P. § 2173.05(g); *In re Swinehart*, 169 U.S.P.Q. 226, 229 (C.C.P.A. 1971); *In re Schreiber*, 44 U.S.P.Q.2d 1429, 1432 (Fed. Cir. 1997). If the Examiner believes the functional limitation to be inherent in the cited reference, then the Examiner "must provide some evidence or scientific reasoning to establish the reasonableness of the examiner's belief that the functional limitation is an inherent characteristic of the prior art." *Ex parte Skinner,* 2 U.S.P.Q.2d 1788, 1789 (Bd. Pat. App. & Inter. 1986).

Bernier is missing features recited by independent claims 1, 12, 23, 34 and 35.

The independent claims 1, 12, 23, 34, and 35 are reproduced below along with emphasis added to features missing from the Bernier reference.

Independent claim 1 recites, *inter alia*:

> an engine service database containing engine data for fuel-powered engines; a data segmenting component that segments the engine data into a plurality of groups, and each group clusters a portion of the engine data based on similarities in engine operating parameters, based on each specific engine, and based on time periods of data acquisition; and an engine baseline modeling component that builds an engine baseline model for each of the plurality of groups using regression analysis, wherein the regression analysis relates engine performance variables as functions of the engine operating parameters. (emphasis added)

Independent claim 12 recites, *inter alia*:

> storing engine data in an engine service database for fuel-powered engines; processing the engine data into a predetermined format in a preprocessor, wherein the processing includes segmenting the engine data into a plurality of groups based upon similarities in engine operating parameters, based on each specific engine, and further based upon specific time periods during which each data element was measured; building an engine baseline model for each of the plurality of groups using regression analysis, wherein the regression analysis relates engine

> performance variables as functions of the engine operating conditions. (emphasis added)

Independent claim 23 recites, *inter alia*:

> instructions for storing engine data in an engine service database for fuel-powered engines; instructions for processing the engine data into a predetermined format in a preprocessor, wherein the instructions for processing include instructions for segmenting the engine data into a plurality of groups based upon similar engine operating parameters and further based upon specific time periods during which each data element was measured; instructions for building an engine baseline model for each of the plurality of groups using regression analysis, wherein the regression analysis relates engine performance variables as functions of the engine operating parameters. (emphasis added)

Independent claim 34 recites, *inter alia*:

> storing engine data in an engine service database for combustion-based engines; clustering the engine data into a plurality of groups each based on similarities in engine operating conditions, based on each specific engine, and based on time periods of data acquisition; building an engine baseline model for each of the plurality of groups using regression analysis, wherein the regression analysis relates engine performance variables as functions of the engine operating conditions. (emphasis added)

Independent claim 35 recites, *inter alia*:

> instructions for storing engine data in an engine service database for combustion-based engines; segmenting the engine data into a plurality of groups representative of different clusters of similar engine operating parameters comprising altitude, air speed, air temperature, fuel specific heat value, air humidity, control settings, or a combination thereof; instructions for building an engine baseline model for each of the plurality of groups using regression analysis, wherein the regression analysis relates engine performance variables as functions of the engine operating parameters. (emphasis added)

First, Bernier does not teach or suggest an engine *service* database containing engine data for fuel-powered engines, as generally recited by independent claim 1, 12, 23, 34 and 35. In the "Response to argument" section in page 10 of the current Office Action, the Examiner refers to para 0020, line 1-4 and 9-11 of the current application and takes the position that the applicant's

engine service database contains only engine performance information. The Examiner refers to column 1, lines 56-60; column 1, lines 65-67 and column 5, lines 5-10 of Bernier and apparently equates "recorded engine performance data" with engine service database. However, the Examiner does not appear to give any weight to the "service" limitation set forth in the claims. Even if Bernier records data, the recorded data is not necessarily related to "service" as recited by the present claims. In sharp contrast, as has been pointed out earlier in reference to column 1, lines 56-60; column 1, lines 65-67 and column 5, lines 5-10 of Bernier, "recorded engine performance data is either transmitted to the ground based monitoring station or, more typically, stored on magnetic tape or other media within the aircraft for delivery to the ground station at a later convenient time". In fact, the Bernier reference is completely silent about any "service database" as recited in the present claims. Therefore, contrary to the Examiner's assertion, there apparently is *no* engine *service* database and Bernier does not teach or suggest the foregoing features of independent claims 1, 12, 23, 34 and 35. In view of these deficiencies, among others, the cited reference cannot anticipate independent claims 1, 12, 23, 34 and 35 and their dependent claims.

Second, Bernier does not teach or suggest data segmenting, clusters, or the like, as generally recited by independent claim 1, 12, 23, 34 and 35. The Applicant refers to the Abstract, lines 18-24, column 6, lines 17-23 and column 35, lines 47-54 of Bernier as cited by the Examiner and respectfully stresses that nowhere does Bernier disclose or teach any data segmenting component that segments the engine data into a plurality of groups, and each group clusters a portion of the engine data. In sharp contrast, the passage in column 35, lines 47-54 of Bernier states that "each set of independent performance parameters that is associated with a particular dependent performance parameter is selected by statistical analysis of engine system operating data (*linear regression*) that relates to the type of engine being monitored so that the independent performance parameters generically characterize the type of engine to be monitored with the simulation coefficients characterizing the particular engine being monitored relative to others of the same type". In fact, the Bernier reference is completely silent about any

"segmenting" or "cluster". Therefore, contrary to the Examiner's assertion, Bernier does not teach or suggest any data segmenting, clusters, or the like, among other features, of independent claims 1, 12, 23, 34 and 35. In view of these deficiencies, among others, the cited reference cannot anticipate independent claims 1, 12, 23, 34 and 35 and their dependent claims.

Third, Bernier does not teach or suggest an engine *baseline* model for each of the plurality of groups using regression analysis as generally recited by independent claims 1, 12, 23, 34 and 35. In the "Response to Argument" section in page 12 of the current Office Action, the Examiner takes the position that the applicant's baseline models deal with regression models for engine performance prediction. The Examiner further maintains that Bernier's regression models are the same as the baseline models of the applicant. The Applicant respectfully traverses the Examiner's position. Although the Applicant does not intend or suggest that the specification should be read into the claims, the Applicant submits that the specification provides context that can assist the Examiner with his examination of the present claims. The application, for example, discloses:

> An engine baseline modeling component 34 builds an engine baseline model from the data processed by the preprocessor 32. In particular, the engine baseline model built by the engine baseline modeling component relates the selected performance variables as a function of engine operating conditions using the processed data. Engine operating conditions include engine, aircraft and environmental conditions. In this disclosure, the *engine baseline model is built from a regression analysis*. Generally speaking, a regression is the statistical science of determining an equation from a finite number of points that provides values of Y for a given X, i.e., Y=f(X). In this disclosure, the equation to be determined can be expressed as:
>
> $$Y = f(\text{altitude, temperature, power setting, air speed}) \quad (1)$$
>
> where altitude, temperature, power setting and air speed are the X variables. The engine baseline modeling component 34 performs a regression to determine the above equation for each of the selected engine performance variables (i.e., *power setting, altitude, air speed, and air temperature*) during specified times that the engine is operating. For instance, the engine modeling component 34 can perform the regression on the data taken during the take-off,

> climb and cruise for any or all of the engine performance variables. One of ordinary skill in the art will recognize that more engine performance variables (air humidity, control settings, etc.) or less engine performance variables can be used in equation 1. In addition, one of ordinary skill in the art will recognize that different combinations of engine performance variables can be used in equation 1. Paragraphs 0025-0026. (Emphasis added.)

The Examiner refers to column 6, lines 17-25; column 12, lines 19-32 and column 12, lines 47-55 of Bernier and apparently equates determination of a set of desired dependent engine parameters with an engine baseline model for each of the plurality of groups using regression analysis. The Applicant respectfully stresses that nowhere does Bernier disclose or teach any engine baseline model for each of the plurality of groups using regression analysis. In sharp contrast, in reference to column 6, lines 17-25; column 12, lines 19-32 and column 12, lines 47-55, Bernier merely discloses "a set of independent engine parameters (x.sub.i) for estimating the values of a set of desired dependent engine parameters is determined from engine performance data of the particular type of engine to be monitored (e.g., a Pratt-Whitney JT8 or JT9 type engine, or even more generally, any high bypass, twin spool gas turbine engine), by linear regression analysis of such engine performance data". In fact, the Bernier reference is completely silent about any "baseline model". Therefore, contrary to the Examiner's assertion, there apparently is *no* engine *baseline* model for each of the plurality of groups using regression analysis and Bernier does not teach or suggest the foregoing features of independent claims 1, 12, 23, 34 and 35. In view of these deficiencies, among others, the cited reference cannot anticipate independent claims 1, 12, 23, 34 and 35 and their dependent claims.

Fourth, Bernier does not teach or suggest additional features recited by independent claims 12 and 23. Independent claim 12 recites, *inter alia*, "using the engine baseline model to monitor engine status, predict future engine behavior, diagnose engine faults, identify when engine performance is out of specification, identify engine quality, or design a new engine system, or a combination thereof." Independent claim 23 recites, *inter alia*, "instructions for using the engine baseline model to monitor engine status, predict future engine behavior,

diagnose engine faults, identify when engine performance is out of specification, identify engine quality, or design a new engine system, or a combination thereof."

Bernier does not teach or suggest the foregoing features of independent claims 12 and 23. The Examiner refers to Abstract, lines 1-12 and lines 16-18 and FIG. 1, item 62 of Bernier and apparently equates "system fault logic" with monitor engine status, predict future engine behavior, diagnose engine faults, identify when engine performance is out of specification, identify engine quality, or design a new engine system. The Applicant respectfully stresses that nowhere does Bernier disclose or teach any monitor engine status, predict future engine behavior, diagnose engine faults, identify when engine performance is out of specification, identify engine quality, or design a new engine system. Therefore, contrary to the Examiner's assertion, Bernier does not teach or suggest the foregoing features of independent claims 12 and 23. In view of these deficiencies, among others, the cited reference cannot anticipate independent claims 12 and 23 and their dependent claims.

For at least these reasons, among others, the Applicant respectfully requests withdrawal of the rejections under 35 U.S.C. § 102.

Dependent claims 8, 19 and 30.

Dependent claim 8 recites, *inter alia*, "a data acquisition component that extracts engine data from the engine services database". Dependent claim 19 recites, *inter alia*, "processing step further comprising extracting engine data from the engine services database". Dependent claim 30 recites, *inter alia*, "processing further comprise one or more instructions for extracting engine data from the engine services database."

Bernier fails to teach or suggest the foregoing features of a data acquisition component that extracts engine data from the engine services database as is generally recited in dependent claims 8, 19 and 30. Bernier only discloses that once the engine data is received at the ground

station, it is generally "conditioned" by filtering techniques to remove a substantial portion of the noise content and to normalize the data so that it is amenable to processing within the particular computer and analysis routine that is employed. Futhermore, after such conditioning and normalization, the data is stored within a data bank for later computer processing. Applicant has carefully reviewed the sections (column 1, lines 49-67 and column 5, lines 19-28) referenced by the Examiner and submits that these sections fail to disclose any data acquisition component or any extraction of engine data from the engine services database.

In view of the foregoing deficiencies in the teachings of the prior art, the reference cannot establish a *prima facie* case of anticipation of claims 8, 19 and 30. Accordingly, these claims are believed to be clearly patentable over the cited reference. Their reconsideration and allowance are respectfully requested.

For at least these reasons among others, the Applicant respectfully requests withdrawal of the rejections under 35 U.S.C. § 102.

Rejections Under 35 U.S.C. § 103

The Office Action summarizes claims 7, 18 and 29 as rejected under 35 U.S.C. §103(a) as being unpatentable over Bernier) in view of Rizzoni et al. (U.S. Patent No. 5,687,082; hereinafter "Rizzoni"). The Applicant respectfully traverses these rejections.

Legal Precedent

The burden of establishing a *prima facie* case of obviousness falls on the Examiner. *Ex parte Wolters and Kuypers*, 214 U.S.P.Q. 735 (PTO Bd. App. 1979). In addressing obviousness determinations under 35 U.S.C. § 103, the Supreme Court in *KSR International Co. v. Teleflex Inc.*, No. 04-1350 (April 30, 2007), reaffirmed many of its precedents relating to obviousness including its holding in *Graham v. John Deere Co.,* 383 U.S. 1 (1966). In *Graham*, the Court set out an objective analysis for applying the statutory language of §103:

> Under §103, the scope and content of the prior art are to be determined, differences between the prior art and the claims at issue are to be ascertained, and the level of ordinary skill in the pertinent art are to be resolved. Against this background the obviousness or non-obviousness of the subject matter is to be determined. Such secondary considerations as commercial success, long-felt but unresolved needs, failure of others, etc., might be utilized to give light to the circumstances surrounding the origin of the subject matter sought to be patented. *KSR*, s*lip op.* at 2 (citing *Graham*, 383 U.S. at 17-18).

In KSR, the Court also reaffirmed that "a patent composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art." *Id.* at 14. In this regard, the *KSR* court stated that "it can be important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does … because inventions in most, if not all, instances rely upon building blocks long since uncovered, and claimed discoveries almost of necessity will be combinations of what, in some sense, is already known." *Id.* at 14-15. Traditionally, to establish a *prima facie* case of obviousness, the CCPA and the Federal Circuit have required that the prior art not only include all of the claimed elements, but also some

teaching, suggestion, or motivation to combine the known elements in the same manner set forth in the claim at issue. *See, e.g., ASC Hospital Systems Inc. v. Montifiore Hospital,* 221 U.S.P.Q. 929, 933 (Fed. Cir. 1984) (holding that obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention absent some teaching or suggestion supporting the combination.); *In re Mills,* 16 U.S.P.Q.2d 1430, 1433 (Fed. Cir. 1990) (holding that the mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination). In *KSR*, the court noted that the demonstration of a teaching, suggestion, or motivation to combine provides a "helpful insight" in determining whether claimed subject matter is obvious. *KSR, slip op.* at 14. However, the court rejected a *rigid* application of the "TSM" test. *Id.* at 11. In this regard, the court stated:

> The obviousness analysis cannot be confined by a formalistic conception of the words teaching, suggestion, and motivation, or by overemphasis on the importance of published articles and explicit content of issued patents. The diversity of inventive pursuit and of modern technology counsels against limiting the analysis in this way. In many fields it may be that there is little discussion of obvious techniques or combinations, and it often may be the case that market demand, rather than scientific literature, will drive design trends. *Id.* at 15.

In other words, the *KSR* court rejected a rigid application of the TSM test which requires that a teaching, suggestion or motivation to combine elements in a particular manner must be explicitly found in the cited prior art. Instead, the *KSR* court favored a more expansive view of the sources of evidence that may be considered in determining an apparent reason to combine known elements by stating:

> Often, it will be necessary for a court to look to interrelated teachings of multiple patents; the effects of demands known to the design community or present in the marketplace; and the background knowledge possessed by a person having ordinary skill in the art all in order to determine whether there was an apparent reason to combine in the known elements in the fashion claimed in the patent at issue. *Id.* at 14.

The *KSR* court also noted that there is not necessarily an inconsistency between the idea underlying the TSM test and the *Graham* analysis, and it further stated that the broader application of the TSM test found in certain Federal Circuit decisions appears to be consistent with *Graham*. *Id.* at 17-18 (citing *DyStar Textilfarben GmbH and Co. v. C.H. Patrick Co.,* 464 F.3d 1356, 1367 (2006) ("Our suggestion test is in actuality quite flexible and not only permits but *requires* consideration of common knowledge and common sense"); *Alza Corp. v. Mylan Labs, Inc.,* 464 F.3d 1286, 1291 (2006) ("There is flexibility in our obviousness jurisprudence because a motivation may be found *implicitly* in the prior art. We do not have a rigid test that requires a teaching to combine … ")).

Furthermore, the *KSR* court did not diminish the requirement for objective evidence of obviousness. *Id.* at 14 ("To facilitate review, this analysis should be made explicit. See *In re Kahn,* 441 F.3d 977, 988 (CA Fed. 2006) ("[R]ejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness"). As our precedents make clear, however, the analysis need not seek out precise teachings directed to the specific subject matter of the challenged claim, for a court can take account of the inferences and creative steps that a person of ordinary skill in the art would employ."); s*ee also, In re Lee,* 61 U.S.P.Q.2d 1430, 1436 (Fed. Cir. 2002) (holding that the factual inquiry whether to combine references must be thorough and searching, and that it must be based on *objective evidence of record*).

When prior art references require a selected combination to render obvious a subsequent invention, there must be some reason for the combination other than the hindsight gained from the invention itself, i.e., something in the prior art as a whole must suggest the desirability, and thus the obviousness, of making the combination. *Uniroyal Inc. v. Rudkin-Wiley Corp.*, 837 F.2d 1044, 5 U.S.P.Q.2d 1434 (Fed. Cir. 1988). One cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention. *In re Fine*,

837 F.2d 1071, 5 U.S.P.Q.2d 1596 (Fed. Cir. 1988). The Federal Circuit has warned that the Examiner must not, "fall victim to the insidious effect of a hindsight syndrome wherein that which only the inventor taught is used against its teacher." *In re Dembiczak*, F.3d 994, 999, 50 U.S.P.Q.2d 52 (Fed. Cir. 1999) (quoting *W.L. Gore & Assoc., Inc. v. Garlock, Inc.*, 721 F.2d 1540, 1553, 220 U.S.P.Q. 303, 313 (Fed. Cir. 1983)).

It is improper to combine references where the references teach away from their combination. *In re Grasselli*, 713 F.2d 731, 743, 218 U.S.P.Q. 769, 779 (Fed. Cir. 1983); M.P.E.P. § 2145. Moreover, if the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious. *In re Ratti*, 270 F.2d 810, 123 U.S.P.Q. 349 (CCPA 1959); *see* M.P.E.P. § 2143.01(VI). If the proposed modification or combination would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification. *In re Gordon*, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984); *see* M.P.E.P. § 2143.01(V).

The cited references, taken alone or in hypothetical combination, fail to teach or suggest features recited by independent claims 1, 12, 23, 34 and 35.

Bernier fails to teach or suggest the foregoing features of an engine *service* database, data segmenting, clusters, or the like, and an engine *baseline* model as discussed in detail above in relation to the argument on the 35 U.S.C. § 102(b) rejection of independent claims 1, 12, 23, 34 and 35. Moreover, Bernier fails to teach or suggest the foregoing feature of using the engine baseline model to monitor engine status, predict future engine behavior, diagnose engine faults, identify when engine performance is out of specification, identify engine quality, or design a new engine system, or a combination thereof as discussed in detail above in relation to the argument on the 35 U.S.C. § 102(b) rejection of independent claims 12 and 23.

The secondary reference does not obviate the deficiencies of Bernier. Rizzoni discloses a model to predict the quality of a lubricant base stock for use in a plurality of products having a plurality of viscosities. The compositional model is based on a quantitative analysis of key compositional parameters and performance criteria for the plurality of products representing the plurality of viscosities. Applicant has carefully reviewed the Rizzoni reference and submits that this reference fails to disclose the claim features recited above. Instead, this reference relates to quality analysis of a lubricant base stock. For at least this reason, among others, the hypothetical combination of Bernier and Rizzoni cannot support a *prima facie* case of obviousness of the present claims.

As a result, the cited references, taken alone or in hypothetical combination, fail to support a *prima facie* case of obviousness of independent claims 1, 12, 23, 34 and 35 and their dependent claims. For at least this reason, the Applicant respectfully requests withdrawal of the foregoing rejections.

Dependent claims 7, 18, and 29.

Dependent claim 7 recites, *inter alia*, that "the preprocessor maps engine data to an uncorrelated data set using a principal component analysis technique". Dependent claim 18 recites, *inter alia*, "mapping engine data to an uncorrelated data set using a principal component analysis technique." Dependent claim 29 recites, *inter alia*, "instructions for mapping engine data to an uncorrelated data set using a principal component analysis technique."

The Examiner stated that Bernier fails to teach or suggest the foregoing feature of mapping engine data to an uncorrelated data set using a principal component analysis technique as generally recited in dependent claims 7, 18 and 29 and the Examiner relied on the Rizzoni reference for disclosure of the same features. Applicant respectfully submits that Rizzoni fails to obviate the deficiencies in the teachings of Bernier as discussed in detail above. Rizzoni discloses a method of combustion analysis in an internal combustion engine providing a first set

of characteristic parameters relating a plurality of spark plug voltage waveform signals with a plurality of combustion quality measures, sampling a first spark plug voltage waveform signal, generating a second set of characteristic parameters based on said first spark plug voltage waveform signal and, classifying said first combustion process as one of said plurality of combustion quality measures based on a correlation between said first set of characteristic parameters and said second set of characteristic parameters.

Applicant has carefully reviewed the Rizzoni reference (column 1, lines 9-14; column 3, lines 32-34; column 5, lines 4-7; column 7, lines 5-24;) and submits that this reference fails to disclose mapping engine data to an uncorrelated data set using a principal component analysis technique as recited in dependent claims 7, 18 and 29. Instead, Rizzoni specifically discloses that "The principal component analysis PCA method 20 maps derived *principal components of the sampled waveform into an N-dimensional space derived beforehand* based upon a test engine model analysis" Rizzoni, column 5, lines 4-7.

Rizzoni further discloses:

> The principal component analysis PCA method of the present invention according to the instant embodiment is a very effective and efficient device for distilling the few essential features of a very large data set. Pattern classification is performed in a particularly efficient manner using the essential features extracted from the otherwise overwhelming signal set under investigation.
>
> By way of background, the PCA method is a matrix operation which consists of computing the eigenvalues and eigenvectors of the covariance matrix for a known data set. As a rule of thumb, the covariance matrix may be estimated. In that case, if care is taken to ensure that the data used in estimating the covariance matrix is representative of all of the particular conditions to later be identified in a measured signal, the eigenvalues and eigenvectors of the estimated covariance matrix provide a nearly precise measure of the principal components of the signal set under investigation. In PCA, the M principal components of a data set are defined as the M eigenvectors corresponding to the largest M eigenvalues of the covariance matrix. Rizzoni, column 7, lines 5-24.

The Applicant stresses that the use of principal component analysis as a very effective and efficient device for distilling the few essential features of a very large data set is completely different from mapping engine data to an uncorrelated data set as recited in dependent claims 7, 18 and 29. For at least this reason, among others, the hypothetical combination of Bernier and Rizzoni cannot support a *prima facie* case of obviousness of the present claims.

New Claims

As noted above, the Applicant hereby adds new dependent claims 36-41. These claims do not add any new matter. Moreover, these new claims recite a variety of features that are missing from the cited references, taken alone or in hypothetical combination. Accordingly, the Applicant respectfully requests allowance of the newly added claims 36-41.

Conclusion

In view of the remarks and amendments set forth above, Applicant respectfully requests allowance of the pending claims. If the Examiner believes that a telephonic interview will help speed this application toward issuance, the Examiner is invited to contact the undersigned at the telephone number listed below.

Respectfully submitted,

Date: November 8, 2007

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